

In the Claims

Applicants have submitted a new complete claim set including marked up claims with insertions and deletions indicated by underlining and strikeouts, respectively,

Please amend pending claims 581-583, 595, 597, 601-604, 614, 615, 620-623, and 625-627, as noted below.

1-580. (Cancelled)

581. (Currently amended) A composition, comprising particulate apatite having an average apatite particle size of less than 1 μm , an average apatite crystal size of less than 150 nm and a surface area of at least ~~about~~ 40 m^2/g .

582. (Currently amended) The composition of claim 581, wherein the particulate apatite has a surface area of at least ~~about~~ 60 m^2/g .

583. (Currently amended) The composition of claim 582, wherein the particulate apatite has a surface area of at least ~~about~~ 100 m^2/g .

584. (Previously added) The composition of claim 581, wherein the particulate apatite has an average apatite particle size of less than 0.5 μm .

585. (Previously added) The composition of claim 581, wherein the particulate apatite has an average crystal size of less than 100 nm.

586. (Previously added) The composition of claim 581, wherein the particulate apatite is densified.

587. (Previously added) The composition of claim 581, wherein the particulate apatite undergoes apatite phase decomposition of less than 10% when exposed to conditions of at least 1300 $^{\circ}\text{C}$ for at least 2 hours.

588. (Previously added) The composition of claim 581, further comprising an auxiliary structural additive.

589. (Previously added) The composition of claim 588, wherein the auxiliary structural additive comprises a ceramic additive.

590. (Previously added) The composition of claim 589, wherein the ceramic additive comprises a metal oxide.

591. (Previously added) The composition of claim 590, wherein the metal oxide comprises zirconia.

C1 592. (Previously added) The composition of claim 588, wherein the auxiliary structural additive is a metal or alloy.

593. (Previously added) The composition of claim 588, wherein the auxiliary structural additive is present in an amount of between about 1% and about 50% by volume.

594. (Previously added) The composition of claim 581, wherein the particulate apatite is carbonated apatite.

595. (Currently amended) The composition of claim 581, wherein the particulate apatite ~~comprises an~~ is admixed with an organic species.

596. (Previously added) The composition of claim 595, wherein the organic species is a self-assembling surfactant or a polymer.

597. (Currently amended) An article comprising a densified apatite structure having a dimension of at least ~~about~~ 0.5 cm and an average XRD crystal size of less than ~~about~~ 250 nm, wherein the apatite structure undergoes phase decomposition of less than ~~about~~ 10% when exposed to conditions of at least ~~about~~ 1300 °C for at least ~~about~~ 2 hours and has a compressive strength of at least about 150 MPa.

598. (Previously added) The article of claim 597, wherein the densified apatite structure has a density of at least about 90%.

599. (Previously added) The article of claim 598, wherein the densified apatite structure has a density of at least about 98%.

600. (Canceled)

601. (Currently amended) The article of claim 597, wherein the densified apatite structure has a compressive strength of at least about ~~150~~ 500 MPa.

602. (Currently amended) The article of claim 601, wherein the densified apatite structure has a compressive strength of at least about ~~500~~ 700 MPa.

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603. (Currently amended) The article of claim 597, wherein the phase decomposition is less than ~~about~~ 5%.

604. (Currently amended) The article of claim 597, wherein the densified apatite structure has an average XRD crystal size of less than ~~about~~ 150 nm.

605. (Previously added) The article of claim 597, wherein the densified apatite structure comprises an auxiliary structural additive.

606. (Previously added) The article of claim 605, wherein the auxiliary structural additive comprises a ceramic additive.

607. (Previously added) The article of claim 606, wherein the ceramic additive comprises a metal oxide.

608. (Previously added) The article of claim 607, wherein the metal oxide comprises zirconia.

609. (Previously added) The article of claim 605, wherein the auxiliary structural additive is nanocrystalline.

610. (Previously added) The article of claim 605, wherein the auxiliary structural additive is a metal or alloy.
611. (Previously added) The article of claim 605, wherein the auxiliary structural additive is present in an amount of between about 1% and about 50% by volume.
612. (Previously added) The article of claim 597, wherein the densified apatite structure comprises carbonated apatite.
613. (Canceled)
614. (Currently Amended) The article of claim 597, wherein the article is at least part of a prosthesis prosthesis.
615. (Currently Amended) The article of claim 614, wherein the article is a prosthesis prosthesis.
616. (Previously added) The article of claim 597, wherein the article comprises an exterior coating on a prosthesis.
617. (Previously added) The article of claim 597, wherein the article is a bioactive implant.
618. (Previously added) The article of claim 617, wherein the bioactive implant is an orthopedic or dental implant.
619. (Previously added) The article of claim 612, wherein the carbonated apatite is a reactive layer on a bioceramic capable of enhancing bioactivity for bone growth.

620. (Currently Amended) An article comprising an apatite structure having ~~having a~~ dimension of at least ~~about~~ 0.5 cm, a density of at least about 98%, a compressive strength of at least about 500 MPa, and an average XRD crystal size of less than ~~about~~ 250 nm.

621. (Currently Amended) The article of claim 620, wherein the apatite structure undergoes phase decomposition of less than ~~about~~ 10% when exposed to conditions of at least ~~about~~ 1300 °C for at least ~~about~~ 2 hours.

622. (Canceled)

623. (Currently Amended) The article of claim 620, wherein the apatite structure has a compressive strength of at least about ~~500~~ 700 MPa.

624. (Currently Amended) The article of claim 621, wherein the phase decomposition is less than ~~about~~ 5%.

625. (Currently Amended) The article of claim 620, wherein the apatite structure has an average XRD crystal size of less than ~~about~~ 150 nm.

626. (Currently Amended) The article of claim 620, wherein the article is a ~~prothesis~~ prosthesis.

627. (Currently Amended) The article of claim 620, wherein the article is at least part of a ~~prothesis~~ prosthesis.

628. (Previously added) The article of claim 620, wherein the article comprises an exterior coating on a prosthesis.

629. (Previously added) The article of claim 620, wherein the article is a bioactive implant.

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630. (Previously added) The article of claim 629, wherein the bioactive implant is an orthopedic or dental implant.

631. (Previously added) The article of claim 620, wherein the apatite structure comprises an auxiliary structural additive.

632. (Previously added) The article of claim 631, wherein the auxiliary structural additive comprises a ceramic additive.

633. (Previously added) The article of claim 632, wherein the ceramic additive comprises a metal oxide.

634. (Previously added) The article of claim 633, wherein the metal oxide comprises zirconia.

635. (Previously added) The article of claim 631, wherein the auxiliary structural additive is nanocrystalline.

636. (Previously added) The article of claim 631, wherein the auxiliary structural additive is a metal or alloy.

637. (Previously added) The article of claim 631, wherein the auxiliary structural additive is added in an amount of between about 1% and about 50% by volume.

638. (Previously added) The article of claim 620, wherein the apatite structure comprises carbonated apatite.

639. (Previously added) The article of claim 638, wherein the carbonated apatite is a reactive layer on a bioceramic capable of enhancing bioactivity for bone growth.

640-673. (Canceled)

674. (New) An article comprising a consolidated apatite structure having a dimension of at least 0.5 cm, an average XRD crystal size of less than 250 nm, and a porosity of at least 20%, wherein the apatite structure undergoes phase decomposition of less than 10% when exposed to conditions of at least 1300 °C for at least 2 hours.

675. (New) The article of claim 674, wherein the consolidated apatite structure has a porosity of at least 50%.

676. (New) The article of claim 675, wherein the consolidated apatite structure has a porosity of at least 75%.

677. (New) The article of claim 674, wherein the consolidated apatite structure has a compressive strength of at least about 150 MPa.

678. (New) The article of claim 674, wherein the phase decomposition is less than 5%.

679. (New) The article of claim 674, wherein the consolidated apatite structure has an average XRD crystal size of less than 150 nm.

680. (New) The article of claim 674, wherein the consolidated apatite structure comprises an auxiliary structural additive.

681. (New) The article of claim 680, wherein the auxiliary structural additive comprises a ceramic additive.

682. (New) The article of claim 681, wherein the ceramic additive comprises a metal oxide.

683. (New) The article of claim 682, wherein the metal oxide comprises zirconia.

684. (New) The article of claim 680, wherein the auxiliary structural additive is nanocrystalline.

685. (New) The article of claim 680, wherein the auxiliary structural additive is a metal or alloy.

686. (New) The article of claim 680, wherein the auxiliary structural additive is present in an amount of between about 1% and about 50% by volume.

687. (New) The article of claim 674, wherein the consolidated apatite structure comprises carbonated apatite.

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688. (New) The article of claim 687, wherein the carbonated apatite is a reactive layer on a bioceramic capable of enhancing bioactivity for bone growth.

689. (New) The article of claim 674, wherein the consolidated apatite structure is formed from an admixture of particulate apatite with an organic species.

690. (New) The article of claim 689, wherein the organic species is a self-assembling surfactant or a polymer.

691. (New) The article of claim 674, wherein the article is at least part of a prosthesis.

692. (New) The article of claim 691, wherein the article is a prosthesis.

693. (New) The article of claim 691, wherein the article comprises an exterior coating on a prosthesis.

694. (New) The article of claim 674, wherein the article is a bioactive implant.

695. (New) The article of claim 694, wherein the bioactive implant is an orthopedic or dental implant.
